

University of Washington

School of Public Health and Community Medicine

Department of Environmental & Occupational Health Sciences

Occupational Epidemiology and Health Outcomes Program

Task 4

Report on the Outcome Evaluation for the Eastern Washington COHE (3 Counties)

Principal Author:

Thomas Wickizer, PhD

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Team Members:

Gary Franklin, MD, MPH, Research Professor, UW Departments of Environmental & Occupational Health Sciences and Neurology

Deborah Fulton-Kehoe, PhD, Research Coordinator, UW Department of Environmental & Occupational Health Sciences

Jeremy Gluck, PhD, Research Scientist, UW Department of Environmental & Occupational Health Sciences

Robert Mootz, DC, Associate Medical Director, Department of Labor and Industries

Terri Smith-Weller, MN, COHN-S, Occupational Health Nurse, UW Department of Environmental & Occupational Health Sciences

Thomas Wickizer, PhD, Professor, UW Department of Health Services

Rae Wu, MD, MPH, Research Consultant, UW Department of Environmental & Occupational Health Sciences

Report on the Outcome Evaluation for the Eastern Washington COHE Executive Summary

Developing new approaches to delivering workers' compensation health care that offer the potential to reduce worker disability, improve employment outcomes, and promote worker satisfaction has been an important goal of the Department of Labor and Industries (L&I) and Business and Labor. L&I is sponsoring an ongoing quality improvement health care delivery system intervention, known as the Occupational Health Services (OHS) project, aimed at reducing worker disability and promoting improved treatment outcomes. This intervention is being tested in two pilot sites:

- Valley Medical Center in Renton, Washington
- St. Luke's Rehabilitation Institute in Spokane, Washington

A research team at the University of Washington is evaluating the OHS project. This report presents the findings of the evaluation conducted on the original Eastern Washington counties (Spokane, Grant and Stevens counties) during the second year of the pilot.

Methods

System Intervention

Each of the two pilot sites developed a Center of Occupational Health and Education (COHE) to recruit health care providers (attending doctors) for the pilot, oversee care and conduct quality improvement activities. The Eastern Washington COHE began recruiting health care providers in March 2003 and started treating injured workers in July 2003.

Research Design

To conduct the evaluation, we assessed disability, satisfaction, employment, and cost outcomes for injured workers treated by COHE providers relative to outcomes of injured

workers treated by a comparison-group of non-COHE providers working within the same Spokane pilot area. We defined the 12-month period beginning July 2004 as the evaluation year and tracked workers, on average, for 15 months. We also gathered data from a baseline (pre-pilot) period representing July 2002 through June 2003. These data, along with other data representing worker age, gender, injury type, and provider type, were used to perform multivariate statistical analysis.

Data, Measures and Analysis

The evaluation is based upon analysis of 11,526 cases treated in the evaluation year, 7,162 COHE cases and 4,364 comparison-group cases. Treatment of the 7,162 COHE cases was provided by 177 health care providers recruited for the pilot who submitted one or more claims during the evaluation year. The comparison-group consisted of all health care providers who were not participating in the COHE and who were delivering medical care to injured workers in the pilot area. For the evaluation year, there were 451 such health care providers.

The measures for the evaluation derived from L&I administrative data include:

- Percent of total cases that went on disability (time loss)
- Percent of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days, or 365 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs
- Total costs (sum of medical and disability costs)

As part of the evaluation, we analyzed other measures obtained from specially designed surveys. These measures include:

- Worker satisfaction with health care
- Worker employment outcomes
- Provider satisfaction

We conducted a series of analyses to assess the effects of the COHE. These analyses primarily involved comparison of measures for COHE cases and comparison-group controls for the evaluation year. All statistical tests were two-sided, with statistical differences defined by p-values of .05.

Results

The evaluation found the incidence of disability (time loss) to be lower for COHE cases than comparison-group cases, and this difference, in part, resulted in lower medical and disability costs for COHE cases. However, COHE cases for which workers had carpal tunnel syndrome showed no difference in disability. The worker satisfaction survey administered as part of the evaluation indicated that COHE injured workers were as satisfied with the care they received as comparison-group injured workers and achieved similar employment outcomes. Data gathered through a provider survey indicated that the majority of COHE providers who responded were satisfied with the pilot, felt their ability to treat injured workers had improved, and reported greater willingness to treat more injured workers in the future.

Major findings regarding disability and cost outcomes include:

- For all cases treated in the evaluation year ($n = 11,526$), COHE injured workers, including those with back pain diagnoses, had lower ($p < .01$) incidence of (time loss) disability: 15.1% versus 21.5%.
- For compensable cases ($n = 2,020$), the proportion of COHE and comparison-group cases on long-term time loss (180-day or 365-day) was similar, but COHE cases treated by “high volume” providers were less likely to be on disability 365 days after claim receipt (2.2% versus 14.0%, $p < .05$).
- For compensable cases, there were no significant differences in mean or median disability days for COHE cases as compared to comparison-group cases.
- For cases treated in the hospital emergency department, there were no significant differences between COHE cases and comparison-group cases with regard to

incidence of time loss or, among compensable cases, the proportion of workers on long-term disability.

- COHE cases and non-COHE cases were equally satisfied with regard to perceived quality of care, coordination of care, difficulty in obtaining care, and related satisfaction measures.
- Among all (11,526) cases treated in the evaluation year, COHE cases experienced lower medical cost¹ per claim ($p < .05$) and lower disability cost per claim ($p < .05$): \$1,643 versus \$2,138 and \$610 and \$930, respectively.
- The evaluation's multivariate statistical analysis estimated savings in cost per claim associated with the COHE of approximately \$475.
- Aggregate net savings based upon 7,000 injured workers treated through the COHE, including annual COHE administrative costs of \$190,000 supported by L&I, would be approximately \$3,135,000 or \$447 per case.

Conclusion

One of the important apparent effects of the Eastern Washington COHE was to lower the incidence of disability among workers, including workers with back pain diagnoses. This reduced disability incidence led to a corresponding reduction in medical and disability costs. These outcomes were achieved without sacrificing provider choice or diminishing worker satisfaction with health care. Opportunities to improve outcomes for workers treated in emergency rooms and with carpal tunnel syndrome exist.

¹ COHE medical costs include additional costs (\$460,000) billed for COHE-specific activities such as telephone contact with employers, providing health services coordination, and submitting the report of accident form within 2 business days. The differences in costs incorporate these additional billings.

Report on the Outcome Evaluation for the Eastern Washington COHE

Introduction

The Department of Labor and Industries (L&I) has had a longstanding interest in improving the quality of health care delivered through the workers' compensation system. L&I has undertaken a number of pilot studies and demonstrations to test quality improvement interventions. One important demonstration was the Managed Care Pilot (MCP), which tested the effects on health outcomes, worker satisfaction and medical costs of delivering health care via provider networks organized through managed care arrangements. The MCP showed that using managed care arrangements to organize care through an occupational medicine model^{1, 2} could save medical costs, and, more importantly, could reduce worker disability and improve return-to-work outcomes. Because workers in the MCP were limited to designated provider networks for their care, worker satisfaction was lower than it would have been otherwise.³

Building on the experience of this pilot and on other scientific information regarding the delivery of occupational health best practices,⁴ L&I sought to develop a system intervention aimed at achieving these same outcomes but without restricting in any way the worker's right to choose a health care provider. Working in collaboration with Business, Labor, and a research team at the University of Washington, L&I designed a quality

¹ Cheadle A, Wickizer TM, Franklin G et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project II: medical and disability costs. Medical Care, 1999 Oct; 37(10):982-93.

² Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. Milbank Quarterly, 2001; 79(1): 5-33.

³ Kyes K, Wickizer TM, Franklin G, et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project I: medical outcomes and patient satisfaction. Medical Care, 1999 Oct; 37(10): 972-81.

⁴ Loisel P, Abenheim L, Durand P. A population-based, randomized clinical trial on back pain management. Spine. 1997 Dec 15; 22(24): 2911-8.

improvement intervention known as the Occupational Health Services (OHS) Pilot Project.¹

The OHS project was intended to be a community-wide quality-improvement intervention that would be implemented through Centers of Occupational Health and Education (COHEs). The COHEs were to recruit community physicians and other health care providers, establish mechanisms to identify high-risk cases for long term disability, develop procedures for coordinating care, implement quality indicators, foster communication between providers and employers, offer training to participating providers, and feedback information to participating providers on their performance.

L&I developed a request for proposal (RFP) and invited health care organizations to apply for funding to implement COHEs on a pilot basis. Two contracts were awarded to establish pilot COHEs, one at Valley Medical Center in Renton and the other at St. Luke's Rehabilitation Institute in Spokane. The Renton COHE was established in 2002 and began seeing workers in July of that year. The Eastern Washington COHE began operations approximately a year later in July 2003.

The University of Washington research team is evaluating the COHEs using a combination of measures collected from administrative data, information collected directly from workers, and data provided from the COHEs. It completed the outcome evaluation of the Western Washington (Renton) COHE in June 2005. This companion report presents the findings of the Eastern Washington (Spokane) outcome evaluation. The same aims that guided our evaluation of the Western Washington COHE guided the evaluation of the Eastern Washington COHE reported here:

- To assess the effect of the COHE on the incidence and duration of disability,

¹ Wickizer TM, Franklin G, Plaeger-Brockway, et al. Improving the quality of workers' compensation health care delivery: the Washington State Occupational Health Services Project. Milbank Quarterly, 2001; 79(1): 5-33.

- To assess the effect of the COHE on worker satisfaction and employment outcomes,¹ and
- To evaluate the effect of the COHE on medical and disability (time loss) costs.

In addition to these three principal aims, our evaluation also addressed a secondary aim of examining COHE-specific activities, such as health services coordination, and other related activities consistent with quality indicators, such as the submission of the report of accident within two business days.

In the sections that follow, we describe the methods used for the evaluation of the Eastern Washington COHE and present the results of analyses conducted to address these aims.

Methods

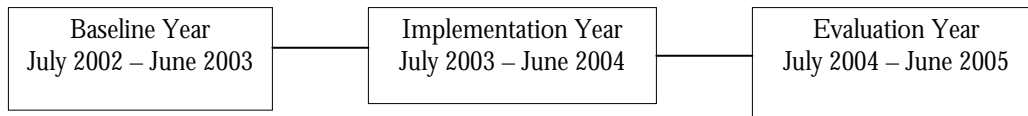
Design

The design we used to conduct the Eastern Washington COHE evaluation was similar to that used for the Renton COHE evaluation. This design, referred to as a “pre-post, comparison-group” design, allows the effects of an intervention to be evaluated relative to a comparison group, and at the same time controls for differences in baseline factors that might affect the outcomes.

The “pre” and “post” periods covered by the evaluation are shown in the figure below. The pre-period corresponds to the baseline year in the figure and covers the 12-month period July 2002 through June 2003. Implementation of the COHE occurred over a 12-month period beginning in July 2003. During this time the COHE developed an organizational infrastructure and implemented different administrative systems. Insofar as the COHE was not fully implemented at this time, workers treated during this period are not included in this outcome evaluation. The “evaluation year” was defined as the 12-month period

¹ To address this aim, we conducted a survey of COHE workers. The results of this survey have been previously reported, “Report on patient satisfaction surveys – Eastern Washington COHE,” (December 2005). This report includes only a brief summary of the findings reported earlier.

beginning in July 2004. Case accrual occurred over this 12-month period. In other words, all incident (new) claims occurring from July 2004 through June 2005 were included in the database constructed for the evaluation. These claims were then tracked through March 2006, providing a follow-up range from 9 to 21 months, with an average follow-up of 15 months.



Selection of Comparison Group

In selecting a comparison group, we followed the same general approach as used for the evaluation of the Renton COHE. This involved identifying attending doctors within the (three-county) Eastern Washington COHE target area who had at least one L&I claim in the baseline or evaluation year and who were not participating in the pilot.¹ One advantage of selecting attending doctors for the comparison group from the community in which the pilot was located is that it increased the likelihood that external factors, such as community health resources, degree of market competition, industrial mix of firms and employment factors, would be similar for the intervention and comparison groups.

Based upon L&I claims data, we identified 663 attending doctors who had treated at least one injured worker in the baseline year, the evaluation year, or both years: 563 attending doctors were listed as the provider on a claim filed in the baseline year and 451 were listed as the attending doctor on a claim filed in the evaluation year (see Table 1 below).

At the time our evaluation was initiated, the Eastern Washington COHE had enrolled 206 health care providers who were listed as the attending doctor on at least one L&I claim

¹ For purposes of this report, we use the term attending doctor. Attending doctor includes physicians, chiropractic doctors, osteopathic physicians, and registered nurse practitioners. Occasionally the report refers to “health care provider,” “physician” or “community physician.” These terms have the same meaning as attending doctor and include the same types of providers.

during the baseline year, the evaluation year, or both years. Of these 206 providers, 156 treated at least one worker in the baseline year and 177 did so in the evaluation year. Though the number of providers recruited by the COHE was less than the number of comparison-group providers, they accounted for roughly 50% more claims (Table 1).

Data and Measures

We obtained L&I administrative data representing all claims filed during the baseline year and evaluation year that listed a comparison-group provider or a COHE provider. The unit of analysis for our evaluation was the claim. Table 1 below shows the claims for COHE providers and comparison-group providers for the baseline and evaluation years. As shown, the 206 COHE providers accounted for 14,478 claims, with roughly equal distribution across the baseline and evaluation years. The 663 comparison-group providers accounted for 9,626 claims in the baseline and evaluation years. All (869) health care providers in the database accounted for 24,104 claims in the baseline and evaluation years combined.

Table 1. Distribution of Cases by Year for COHE group and Comparison Group

	COHE Group No. Doctors (No. Cases)	Comparison Group No. Doctors (No. Cases)	Total No. Doctors (No. Cases)
Baseline Year	156 (7,316)	563 (5,262)	719 (12,578)
Evaluation Year	177 (7,162)	451 (4,364)	628 (11,526)
Total	206 (14,478)	663 (9,626)	869 (24,104)

Note: The providers shown in the table do not represent unduplicated counts.

The primary measures for the evaluation, all derived from L&I administrative data include:

- % of total cases that went on disability (time loss)

- % of cases on disability at different time points post claim receipt, e.g., 90 days, 180 days or 365 days
- Duration of disability measured in days from claim receipt
- Disability costs
- Medical costs
- Total costs (sum of medical and disability costs)

COHE providers were reimbursed for performing selected activities consistent with quality indicators established for the pilot.¹ The medical cost data obtained for the evaluation incorporate the higher (differential) reimbursement rates given to COHE providers.

In addition to the claims data described above, we collected billing data that reflected the specific activities performed by COHE providers and Health Services Coordinators that were eligible for reimbursement under the pilot. These included health services coordinating activities, use of activity prescription forms, early submission of the report of accident, communication with employers to discuss return to work, and assessment of impediments to return to work. As part of our evaluation, we analyzed data pertaining to these activities and report the results below.

Analytical Approaches

We used bivariate (Chi-square and analysis of variance [ANOVA]) as well as multivariate (regression) statistical techniques to evaluate the effects of the COHE. The primary analysis involves a series of bivariate analyses to compare the COHE group with the comparison group on the measures described above for the evaluation year. These analyses provide information on the nature and magnitude of the differences in the outcome measures and whether these differences are statistically significant. All statistical tests are two-tailed, with statistical significance defined by a minimum p-value of .05.

¹ Wickizer TM, Franklin G, Mootz R, et al. A communitywide intervention to improve outcomes and reduce disability among injured workers in Washington State. Milbank Quarterly. 2004;82(3):547-67.

A number of factors beside the COHE could influence the outcome measures noted above. These factors include worker age and gender, type of provider, and type of injury, as well as baseline differences in provider-level costs and disability duration. To estimate the independent effect of the COHE on costs and incidence and duration of disability, we conducted statistical analyses involving the estimation of linear regression models and logistic regression models. This enabled us to assess the effect of the COHE on the outcomes of interest and at the same time to control for the influence of factors such as worker age and gender, injury type, provider type, and baseline differences in costs and disability. Additional information about the statistical analysis performed for the evaluation is provided later in the report.

Results

Descriptive Information on Study Groups

Tables 2 – 4 present descriptive information, based on data for the evaluation year,¹ showing the mix of workers, injuries and providers for the COHE cases and comparison cases. As shown in Table 2, there were modest differences in the age-sex profiles of the COHE group and the comparison group. The COHE group had a slightly higher percentage of male workers and workers aged 25 to 34 but had a smaller percentage of workers aged 55 or older.

Table 3 shows the mix of injuries for the two groups. As indicated, COHE providers treated workers with a somewhat different mix of conditions and injuries. Lacerations and contusions were more common among workers in the COHE group, but “other” injuries, which include a wide mix of conditions, were more common in the comparison group.

Table 4 shows the distribution of first attending doctor, based upon the L&I billing data. As indicated, COHE workers were more likely to receive initial care from a hospital emergency room or a primary care provider, but were less likely to receive care initially from a chiropractor or surgeon.

¹ Unless otherwise indicated, the data presented in all tables is based upon the evaluation year.

Table 2. Age-Gender Profile of Study Population

Category	COHE Group (n = 7,162)	Comparison Group (n = 4,364)
% Male	71.0%	66.9%
% 16-24	22.2%	18.7%
% 25-34	26.7%	20.9%
% 35-44	26.0%	25.9%
% 45-54	17.3%	21.7%
% 55+	7.7%	12.9%

Note: Gender and age were related to intervention status ($p < .05$).

Table 3. Distribution of Injuries

Injury/Condition	COHE Group (n = 7,162)	Comparison Group (n = 4,364)
Back sprain	13.1%	14.5%
Carpal Tunnel Syndrome	1.1%	2.9%
Upper Extremity Fractures	2.2%	1.4%
Lower Extremity Fractures	1.1%	1.4%
Lacerations/Contusions	40.2%	28.9%
Other Sprains	22.7%	19.5%
Other Injuries	19.6%	31.4%

Note: Injury type and intervention status were related ($p < .01$).

Table 4. Distribution of First Attending Doctor

Provider	COHE Group (n = 7,162)	Comparison Group (n = 4,364)
Clinic*	0.1%	9.8%
Hospital Emergency Department Provider	37.5%	32.2%
Chiropractor	3.3%	6.4%
Primary Care Provider	53.7%	37.3%
Surgeon	2.4%	4.5%
Other Physician/Provider +	3.0%	9.8%

Note: Provider type and intervention status were related ($p < .01$).

* Clinic is a L&I billing designation and includes a variety of treatment settings. These treatment settings represent freestanding private clinics, hospital-based clinics, urgent care clinics and chiropractic clinics.

+ Other physician/provider category includes physician specialists, such as dermatologists and pulmonologists, dentists, naturopaths and nurse practitioners.

Finally, Table 5 shows the incidence of disability (time loss) for cases treated during the baseline (pre-intervention) period. Though the table shows some substantial differences in the incidence of disability, only the differences for back sprain and “all injuries” are statistically significant ($p < .05$). Looking across all injuries, 15.0% of the COHE cases as compared to 21.2% of the comparison-group cases became time loss cases.

Though not shown in Table 5, the incidence of long-term disability among compensable cases in the baseline year was similar in the two groups. For example, 15.4% of the compensable COHE cases were on disability one year after claim receipt as compared to 16.5% of the comparison-group cases. Approximately, 23% of the compensable cases in each group were on disability at 180 days after claim receipt.

Table 5. Incidence of Disability (Time Loss) During Baseline Period

Injury/Condition	% of Workers on Disability (Time Loss)	
	COHE (n = 7,316)	Comparison Group (n = 5,262)
Back sprain (n = 1,873)	23.7% *	32.1%
Carpal Tunnel Syndrome (n = 216)	41.5%	53.6%
Fractures (n = 386)	36.8%	44.4%
Other Sprains (n = 2,693)	21.9%	24.7%
All Injuries (n = 12,578)	15.0%	21.2%

Differences are statistically significant: * $p < .05$.

Disability Incidence and Duration for Claims Filed in Evaluation Year

Table 6 presents information concerning the occurrence of disability (time loss) claims for four injury conditions: back sprain, carpal tunnel syndrome, fractures and other sprains, and for injuries overall. The data presented in Table 6 and the tables that follow are based upon claims filed in the evaluation year (July 2004 through June 2005). The incidence of disability was lower in the COHE group except for carpal tunnel syndrome. For example, 22.9% of the cases with back sprain in the COHE group resulted in a disability claim as compared to 30.8% of the comparison-group cases. Overall, 15.1% of the COHE group cases resulted in a disability claim, as compared to 21.5% of the comparison group cases ($p < .01$).

Tables 5 and 6 present similar data for different years. Table 5 shows data for the baseline year, while Table 6 shows data for the evaluation year. There is little overall change in the occurrence of time loss, and it may be tempting therefore to conclude that the COHE had little effect on this outcome measure. Because Tables 5 and 6 present descriptive data,

rather than data based upon statistical analysis, no conclusions about the effect of the COHE should be drawn from these data.

Table 6. Incidence of Disability (Time Loss) Claims During the Evaluation Year

Injury/Condition	COHE (n = 7,162)	Comparison Group (n = 4,364)
Back sprain (n = 1,572)	22.9%	30.8%
Carpal Tunnel Syndrome (n = 207)	49.4%	42.2%
Fractures (n = 362)	32.1% *	42.6%
Other Sprains (n = 2,473)	21.7% **	26.9%
All Injuries (n = 11,526)	15.1% **	21.5%

Differences are statistically significant: * $p < .05$, ** $p < .01$.

Another question of concern to the evaluation was whether among compensable cases the percentage of cases on long-term disability differed between the two groups. This question is addressed in Table 7. Although there were few meaningful differences in the occurrence of long-term (180- or 365-day) disability between the two groups, a significant difference was seen among the important subset of cases with back sprain. Six percent of COHE back sprain cases were on disability 365 days post claim receipt, compared to 11.8% of comparison-group cases. This represents a nearly 50% reduction in risk for long term disability among these cases. The lack of differences in long term disability (except back sprain) among compensable cases contrasts with the pattern shown in Table 6, where COHE cases exhibited lower incidence of time loss among all cases. This pattern may indicate an earlier stage of disability prevention among COHE cases.

Table 7. Proportion of Workers on Disability at 180 Days and 365 Days after Claim Receipt among Compensable (Time Loss) Cases

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 365 Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 410)	22.8%	22.6%	6.0% *	11.8%
Carpal Tunnel Syndrome (n = 93) ⁺	48.7%	31.5%	23.1%	9.3%
Fractures (n = 129)	19.5%	15.4%	9.1%	5.8%
Other Sprains (n = 582)	19.5%	20.1%	10.8%	8.7%
All Injuries (n = 2,020)	20.5%	20.4%	10.2%	9.7%

Differences are statistically significant: * $p < .05$.

+ Note even though the differences in the percentage figures shown for carpal tunnel syndrome are large, they are not statistically significant because of the limited number of cases on time loss at 180 or 365 days.

Table 8 shows information on mean (average) and median disability days among compensable (time loss) cases. Consistent with the percentage figures shown in Table 7, there were few important differences in mean or median disability days (median represents the 50th percentile of the distribution) between the COHE group and the comparison group. For carpal tunnel cases, mean disability days were higher among COHE workers than among comparison-group workers ($p < .05$).

Table 8. Mean and Median Disability Days among Compensable (Time Loss) Cases

Injury/Condition	Mean Days		Median Days	
	COHE	Comp. Group	COHE	Comp. Group
Back sprain (n = 410)	72.5	98.0	21	28
Carpal Tunnel Syndrome (n = 93)	136.3	87.9*	95	55
Fractures (n = 129)	98.9	89.8	54	41
Other Sprains (n = 582)	87.7	87.3	36	28
All Injuries (n = 2,020)	79.5	82.2	27	28

Differences are statistically significant: * $p < .05$.

Tables 9 and 10 present information, based upon time loss payment bi-weekly warrant data, on the incidence of disability (Table 9) and the proportion of cases on long-term disability among compensable cases (Table 10) by provider volume. The numbers shown below the provider categories represent cases treated during the evaluation year. This analysis is limited to two conditions that accounted for a large percentage of cases treated: back sprain and other sprains. The analysis includes two volume strata representing “high volume” providers and “low volume” providers, as well as providers who treated injured workers through the hospital emergency department. High volume providers are defined as providers who treated 200 or more cases per year during the evaluation year; low volume providers treated 80 or fewer cases per year during this same period. Provider volume was based upon provider ID number maintained by L&I for billing purposes. In some cases, a provider number may represent a clinic with several providers or other health care providers rather than a single individual provider. This introduces some inherent (and unavoidable) ambiguity in the analysis. Therefore, caution should be used in interpreting the data presented in Tables 9 and 10. Based upon the criteria described above, there were 12 “high volume” COHE providers and 3 “high volume” comparison-

group providers. The numbers of “low volume” providers in these two groups were, respectively, 196 and 765.

As shown in Table 9, there were few differences between COHE cases and comparison-group cases in the incidence of disability in relation to provider volume or treatment in the hospital emergency department. The one exception was COHE cases with back sprain that were treated by providers in the “high volume” group.

Table 9. Incidence of Disability (Time Loss) for Selected Conditions

Injury/Condition	% of Cases on Disability (Time Loss)	
	COHE	Comparison Group
<u>Back Sprain</u>		
Hospital Emergency Dep't (n = 290)	27.2%	22.7%
High Volume Provider (n = 305)	24.6% *	36.4%
Low Volume Provider (n = 483)	26.7%	28.9%
<u>Other Sprains</u>		
Hospital Emergency Dep't (n = 526)	21.1%	21.3%
High Volume Provider (n = 481)	28.0%	25.5%
Low Volume Provider (n = 639)	22.3%	28.0%

Differences are statistically significant: * p < .05

Table 10 examines the occurrence of long-term disability among compensable cases for injured workers with these same two conditions treated by the same three groups of

providers. As shown, only one comparison exhibited a statistically significant difference: COHE cases with back sprain treated by “high volume” providers were less likely to be on disability at 365 days (after claim receipt) than comparison-group cases (2.2% versus 14.0%, $p < .05$). Because of the small number of comparison-group compensable cases treated in the hospital emergency department, we do not report the percentages of cases on long-term disability (we do report these values for COHE cases).

Table 10. Proportion of Workers on Disability at 180 Days and 365 Days among Compensable Cases on Time Loss for Selected Conditions

Injury/Condition	% on Time Loss at 180 Days		% on Time Loss at 365 Days	
	COHE	Comparison Group	COHE	Comparison Group
<u>Back Sprain</u>				
Hospital Emergency Dep't (n = 73/5) ^	26.0%	-- ⁺	8.2%	--
High Volume Provider (n = 46/43)	15.2%	20.9%	2.2%*	14.0%
Low Volume Provider (n = 44/92)	25.0%	28.3%	11.4%	15.2%
<u>Other Sprains</u>				
Hospital Emergency Dep't (n = 98/13)	9.1%	--	8.1%	--
High Volume Provider (n = 94/37)	22.3%	16.2%	7.4%	10.8%
Low Volume Provider (n = 50/116)	24.0%	25.9%	18.0%	9.5%

Differences are statistically significant: * $p < .05$.

^ Numbers represent COHE cases/comparison-group cases.

⁺ There were too few comparison-group cases treated in the hospital emergency department to permit analysis.

Medical Expenses and Disability Costs

Tables 11 and 12 present information on medical and disability costs for claims incurred in the evaluation year for the same four conditions as analyzed in Tables 5-8 (back sprain, carpal tunnel syndrome, fractures, and other sprains) and for claims overall. Table 11 shows medical costs and disability costs for all cases by injury condition. Table 12 shows only aggregate costs for compensable (time loss) claims.

Mean medical and disability costs for COHE cases with back sprain (Table 11) were significantly lower ($p < .05$) than corresponding costs for comparison-group cases. On the other hand, mean medical and disability costs for COHE cases with carpal tunnel syndrome were significantly higher ($p < .05$) than for comparison-group cases. There was no statistically significant difference in costs for fractures or “other sprains.” Looking across all 11,526 injuries, mean medical and disability costs were significantly less ($p < .05$) for COHE cases than for comparison-group cases. In part, these differences could be explained by the difference in mix of injuries. COHE cases had a greater proportion of lacerations and contusions than comparison-group cases (see Table 3). The approximate total difference in costs per claim, not accounting for these baseline differences, was \$815. Medical costs for COHE cases were, on average, \$495 lower, while disability costs were \$320 lower.

Table 11. Medical and Disability Costs: All Cases

Injury/Condition	<u>Medical Costs</u>		<u>Disability Costs</u>	
	Mean	Median	Mean	Median +
<u>Back Sprain</u>				
COHE Group (n = 939)	\$1,968 *	\$600	\$833 **	--
Comparison Group (n = 633)	\$2,507	\$656	\$1,437	--
<u>Carpal Tunnel Syndrome</u>				
COHE Group (n = 79)	\$4,136	\$2,897	\$2,890	--
Comparison Group (n = 128)	\$2,890 *	\$2,033	\$1,654 *	--
<u>Fractures</u>				
COHE Group (n = 240)	\$3,437	\$844	\$1,301	--
Comparison Group (n = 122)	\$4,164	\$746	\$1,918	--
<u>Other Sprains</u>				
COHE Group (n = 1,623)	\$2,260	\$581	\$887	--
Comparison Group (n = 850)	\$2,244	\$526	\$1,066	--
<u>All Injuries</u>				
COHE Group (n = 7,162)	\$1,643 *	\$413	\$610 *	--
Comparison Group (n = 4,364)	\$2,138	\$399	\$930	--

Note: Differences in mean costs are statistically significant ** $p < .01$, * $p < .05$.

+ The median value represents the 50th percentile of the distribution. Median disability costs are not shown because fewer than half the cases had any positive disability costs; therefore, median disability costs would be zero.

Table 12 shows data on aggregate medical costs and disability costs for compensable (time loss) cases (N = 2,020). As shown, both mean and median medical and disability costs were similar for the COHE group and comparison group.

Table 12. Aggregate Medical and Disability Costs for Compensable (Time Loss) Cases

Group	Medical Costs		Disability Costs	
	Mean	Median	Mean	Median
COHE Group (n = 1,081)	\$7,020	\$3,604	\$4,042	\$1,163
Comparison Group (n = 939)	\$7,069	\$3,727	\$4,321	\$1,476

COHE Activities

As part of our evaluation, we gathered billing data on COHE-specific activities that were performed to improve coordination of care and implement occupational health best practices consistent with quality indicators developed for the OHS pilot. We determined whether a COHE activity occurred by tracking procedure (billing) codes, along with billing modifiers. The specific activities tracked through billing data include:

- Submission of the report of accident within two business days
- Use of activity prescription forms at each visit
- Telephone communication with employers
- Assessment of impediments to return to work at 4 weeks of time loss
- Occupation health education with health experts or mentors
- Health services coordination

Of the 7,162 COHE claims filed during the evaluation year, one or more of the above activities were performed on 6,379 (89%) claims. The number and percentage of claims for which a COHE activity was billed for and paid are shown in rank order according to frequency in Table 13. As indicated, submission of the report of accident within two business days occurred most often (74%), followed by use of activity prescription forms (47%) and by health services coordination and telephone consultation with employer (each 10%). The average cost per claim (across all 7,161 claims) for these COHE activities was \$64. The aggregate cost across all claims was \$460,554, or 4.1% of total medical billings (\$11.2 million).

Table 13. Distribution of COHE Activities

Activity Type	Number of Claims for Which Bills were Submitted and Paid	% of Claims (N = 7,161)
Submission of report of accident with 2 business days	5,304	74.1%
Use of activity prescription forms	3,364	47.0%
Health Services Coordination	729	10.2%
Telephone consultation with employer	722	10.1%
Other telephone consultations	386	5.4%
Medical conference	129	1.8%
Return-To-Work assessment	27	0.4%
Other activities	12	0.2%

Results of Multivariate Statistical Analysis, Adjusting for Baseline Differences in Provider Medical and Disability Costs

The information presented earlier indicated that injured workers treated through the Eastern Washington COHE were less likely to go on disability (time loss) than comparison-group workers. As shown in Table 11, among all cases medical costs and disability costs for COHE cases were, respectively, \$495 and \$320 less than for comparison-group cases. Combining medical costs and disability costs would lead to an approximate difference in total costs of \$815 per case.

Not all of this cost difference is likely to be associated with the COHE, however. As Tables 2 – 5 show, there were differences in a number of factors between the COHE group and the comparison group, including differences in worker age and gender mix (Table 2), differences in injury and provider mix (Table 3 and Table 4), and differences in baseline occurrence of disability (Table 5). These differences may account for some of the observed difference in costs, as well as other differences in disability reported in Table 6 and Table 7.

To more accurately analyze the true effect of the COHE on costs and disability, we tested a series of statistical models that allowed us to generate estimates of the difference in costs and disability associated with the COHE, controlling for the factors described earlier. Three models were estimated: (1) a multiple linear regression model with total costs (medical costs plus disability costs) specified as the dependent variable; (2) a logistic regression model (for all cases) with the dependent variable expressed in binary form indicating whether the case became compensable; and (3) a logistic regression model (for compensable cases only) with the dependent variable expressed in binary form representing whether the worker was on disability at 365 days post claim receipt.

In estimating these models, we controlled for the following factors:

- Age-gender mix of worker
- Injury type
- Type of first attending doctor
- Baseline-year average total costs (medical costs plus disability costs) per provider¹

We sought to identify two types of COHE effects: (1) a “recruitment effect” resulting from the COHE’s efforts to recruit providers interested in and committed to the pilot and its goals of improving occupational health care for injured workers, and (2) a “program operational effect” resulting from the ongoing activities of the COHE such as timeliness of occupational health best practices and health services coordination. Our statistical model enabled us to estimate both effects for our cost analysis.

Summarized below (Table 14) are the results of our statistical analysis. As shown, the COHE was associated with an estimated “recruitment effect” of \$92 per claim. In other words, the COHE’s efforts to recruit providers committed to the goals of the pilot translated into the delivery of care that, on average, yielded costs that were \$92 lower per claim ($p < .01$) independent of other COHE activities. In addition, we estimated the COHE “program operational effect” to be \$385 per claim ($p = .03$). These two effects are additive; the total COHE effect would therefore be approximately \$477 per claim. This estimate implies that 60% of the \$815 difference in total costs reported in Table 11 could be attributed to the effects of the COHE, with the other 40% attributable to differences in other factors, such as worker age, type of provider, and injury type.

¹ Total costs were highly correlated ($r > .90$) with disability days, so only the cost measure was included in the regression model.

The other two measures included in Table 14 are consistent with the information provided earlier in Tables 6 and 7. The statistical analysis indicated that controlling for the effects of the factors noted above, COHE workers were 33% less likely ($p < .001$) to go on disability than comparison-group workers. In contrast, our statistical analysis found that among compensable (time loss) cases, the COHE had little effect on reducing long-term time loss, as measured by whether an injured worker was on disability 365 days after claim receipt.

Table 14. Selected Results of Statistical Analysis of Costs and Disability

Outcome Measure	Estimated Coefficient	Odds Ratio	P-Value
COHE recruitment effect	- \$92	--	.001
COHE program operational effect	- 385	--	.03
Likelihood of case becoming time loss claim	-.40	0.67	.001
On disability at 365 days among compensable cases	.16	1.17	NS

The three counties (Spokane, Stevens and Grant) represented in this analysis differ in a number of respects, especially characteristics of the local health care market and industry mix. Spokane County is the most densely populated county of the three counties with the most well-developed health care system. Although the differences among the counties in the number of cases treated by COHE providers and comparison-group providers were not large (for example, 83.6% of the COHE cases were treated in Spokane County versus 79.5% of the comparison-group cases), it is possible there was some “geographic effect.” To adjust for this possible geographic effect, we repeated the statistical analysis but included variables in the model representing the three counties. In effect, this allowed us

to control for a possible “county effect.” There was no meaningful difference in the results reported in Table 14 when we performed this additional analysis.

The estimated effects of the COHE changed when we limited the analysis to back sprain cases. There was no significant “recruitment effect,” but the “program operational effect” increased almost fourfold to \$1,485 ($p < .01$). The likelihood of a back sprain case becoming a time loss claim also decreased. COHE back sprain cases were 43% less likely to go on disability than comparison-group cases. Perhaps more importantly, the likelihood of a back sprain case becoming a long-term time loss claim (on disability at 365 days) was only 45% as great ($p < .01$) if that case was treated through the COHE.

As part of our analysis, we explored whether submission of the report of accident within two days affected the incidence of disability.¹ Timely submission of the report of accident was found to have an important effect on the incidence of disability. Fifty-four percent of all (11,526) cases treated in the evaluation year had the report of accident submitted within two business days. But COHE providers submitted the report within two business days much more frequently. Whereas 16% of the comparison-group cases had the form submitted within two business days, 77% of the COHE cases did so ($p < .001$). Timely submission of the report of accident reduced the likelihood of a case becoming a compensable claim. Whereas 13.4% of COHE cases for which the report of accident was submitted within two days became compensable, 19.6% of the cases became compensable when the report was submitted later than two days ($p < .01$).

The data generated by the statistical analysis described earlier (Table 14) were based upon comparisons of costs and disability incidence for the evaluation year. This type of analysis does not address the question of whether, or the extent to which, provider behavior

¹ It was not feasible to assess the individual effects of other COHE-specific activities because we were not able to adequately control for unmeasured “selection effects.” For example, COHE cases that received health services coordination were by definition different from COHE cases that did not receive coordination. There was not a practical method of controlling for these differences. This same problem does not arise with the analysis of the submission of the report of accident.

changed over time. To address this question, we conducted a limited analysis comparing changes in the incidence of disability from the baseline year to the evaluation year for cases treated by general practice or family practice providers in the COHE group and comparison group. We stratified the analysis by injury group: back sprain, carpal tunnel syndrome, fractures, other sprains and other injuries. This analysis is important because it provides additional evidence of the potential effect of the COHE on provider behavior.

For two of the five injury groups, back sprain and fractures, the incidence of disability declined from the baseline year to the evaluation (outcome) year for cases treated by COHE providers but increased for comparison-group cases. In particular, for back sprain COHE cases ($n = 841$)¹ the incidence of disability declined from 25.1% to 19.9% ($p = .07$). In contrast, the incidence of disability for comparison-group cases ($n = 466$) increased from 30.2% to 36.3% ($p = .16$). The respective changes in disability incidence for fracture cases for COHE and comparison-group providers were: 29.5% to 22.7% ($p = .29$) and 23.8% to 36.8% ($p = .36$). Even though disability incidence among comparison-group cases increased substantially, it was not statistically significant because of the small number of cases analyzed ($n = 40$). There was little change in disability incidence for “other sprains” among COHE and comparison-group cases. However, disability incidence increased substantially for “other injuries” for comparison-group cases (13.7% to 17.1%, $p = .06$, $n = 1,477$) while remaining essentially unchanged (7.5%) for COHE cases. The exception to this general pattern was carpal tunnel cases. Disability incidence increased for COHE cases from 32.8% to 58.7% ($p = .02$, $n = 133$), while it decreased for comparison-group cases (54.7% to 44.9%, $p = .26$, $n = 80$). Although few of the changes in disability incidence achieved statistical significance, due in part to the limited number of cases analyzed for some injury groups (with the notable exception of carpal tunnel syndrome), the direction of change for back sprain and fractures provides further evidence of a favorable COHE effect.

¹ Only cases treated by providers who had at least one claim in both the baseline and evaluation years were included in the analysis.

Effects of COHE on Worker Satisfaction and Employment Outcomes

One of the aims of the outcome evaluation was to assess worker satisfaction and employment outcomes for the COHE. This was done through a worker satisfaction survey administered as a telephone interview over several months beginning in May 2005. The survey respondents, selected on the basis of the initiation of their treatment, included 668 injured workers treated through the COHE and 454 workers treated by comparison-group providers. The detailed results of this survey were reported earlier to L&I in a separate report.

In general, both groups of workers were quite satisfied with the quality of the care they received. That is, injured workers who received treatment from a COHE provider were no more or no less satisfied with their care than workers who received treatment from other providers in the COHE pilot area. Further, we found no significant differences in employment outcomes or recovery status. The one measure that did exhibit a difference was workers' self-report of contact between the provider and the employer. Respondents in the COHE group were 57% more likely to report their provider had contacted their employer than respondents in the comparison group.

Provider Satisfaction

As part of our evaluation, we conducted a limited survey of COHE providers in November and December 2005 to assess their general satisfaction with the pilot. At the time of the survey, 114 health care providers in the three-county area were participating in the pilot, each of whom was sent a mailed questionnaire. Fifty-two providers (out of 114) returned the questionnaire. Forty-six percent of the respondents were primary care doctors, 34% were chiropractic doctors, 5% were specialists, 12% were nurse practitioners, and the remaining 3% were other providers. The responses to the survey were favorable and indicated that the majority of providers felt their participation in the pilot was valuable. For example, 79% of the respondents indicated their ability to treat injured workers had improved since they became involved in the pilot. Seventy-five percent of the respondents

indicated they were satisfied with their experience in treating injured workers through the COHE, a 58% increase over the number of respondents indicating satisfaction prior to participating in the COHE. Almost 70% of the respondents indicated the COHE experience had improved their ability to communicate with employers. Finally, 52% of the provider respondents indicated that were willing to treat more injured workers in the future as a result of their experience with the COHE.

Conclusion

This report has summarized the findings of the University of Washington research team's evaluation of the Eastern Washington COHE. As part of a broader system innovation designed by L&I to improve quality and foster occupational health best practices, the COHE was intended to reduce disability among injured workers. Drawing on administrative data obtained from L&I, we compared disability and other outcomes for injured workers treated through the COHE to outcomes for injured workers who were treated by a comparison group of health care providers delivering care in the same general area as that served by the COHE. We focused our evaluation on assessing disability patterns, worker satisfaction, disability costs, and medical costs.

The principal finding emerging from this evaluation was the association between the COHE and reduced incidence of disability (time loss). Workers who received care from a COHE provider were 33% less likely to go on time loss compared to comparison-group workers; in other words, the onset of disability was prevented and the risk of becoming disabled substantially reduced. Among cases who had any time loss (compensable cases), the COHE significantly reduced the risk of long term disability for back sprain cases, particularly among high volume providers. However, the COHE had little additional effect on reducing long-term (180-day or 365-day) disability for workers with other injuries once these workers became disabled. Nonetheless, the marked reduction in the incidence of disability led to a corresponding reduction in both medical and disability costs. Our statistical analysis, which accounted for provider baseline cost differences, indicated the COHE was associated with an average reduction in costs (medical and disability

combined) of approximately \$385. In addition, the COHE's recruitment efforts led to the voluntary decision of 206 health care providers to participate in the pilot. These providers exhibited different practice patterns than comparison-group providers, leading to a lower incidence of time loss (Table 5), even before the pilot started. We estimated that this "recruitment effect" translated into costs per claim (medical and disability) that were \$92 less during the evaluation year. Thus the total cost-per-claim difference specifically associated with the COHE was approximately \$475.

The COHE treated approximately 7,000 workers during the evaluation year. Therefore, the aggregate reduction in costs associated with COHE operations would be on the order of \$3,325,000. Allowing for \$190,000 in administrative expenses L&I made available through the COHE contract for the evaluation year would reduce these savings to \$3,135,000. Thus, the net savings per case would be approximately \$447.

The results reported here compare favorably with those reported for the managed care pilot. The evaluation of that demonstration found estimated medical savings on the order of \$160 per case, and savings in disability costs of \$285 per case, or \$445 total savings per case. The findings of this evaluation showed the net cost saving associated with the Eastern Washington COHE, \$447 per case, to be almost identical to that estimated for the managed care pilot. However, unlike the managed care pilot, the COHE did not restrict the workers' choice of provider in any way. Unlike managed care workers, COHE workers were not any less satisfied with the care they received.

The Eastern Washington COHE was a broad-based community intervention that appears to have substantially reduced disability among injured workers, and thereby saved resources, without sacrificing provider choice or diminishing worker satisfaction. This evaluation builds on the prior evaluation of the Renton COHE and provides further evidence of the favorable effects of improving the quality of care delivered to injured workers through fostering occupational health best practices.

The two COHEs not only reflect different geographic regions, but also differences in industries, workforce, the health delivery market, and intervention approaches. Potentially important design and outcome effects of the Renton and Eastern Washington COHEs will be explored and contrasted in a combined evaluation due in December 2006. Greater emphasis in this analysis will be placed on important individual components, both quantitative and qualitative, that may help explain the important “operational” effects demonstrated in these COHE evaluation reports. In particular, to better sustain and enhance the positive effects on disability prevention demonstrated in both COHEs, an emphasis on relative strengths as well as areas of improvement for current and future COHE efforts will be identified.